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The purpose of this study was to develop a framework for testing the validity of 2 conflicting theories of college effects. The "relative deprivation" theory suggests that college selectivity is a negative determiner of college grades that a student's academic ability determines both college grades and educational plans, and that poor grades lead to a devaluation of a student's ability self-concept and thus to a decrease in educational plans. The "environmental press" theory suggests that college selectivity upgrades a student's educational plans and that the "environmental press" at highly selective colleges motivates students to increase their educational plans, which in turn will approach the norm of the college they attend. Input data for a statistical model were collected on 127,125 entering freshmen at 248 4-year colleges and universities in the fall of 1961. Follow-up data were collected in the summer of 1962 as part of a larger study of intellectual and social environments of undergraduate institutions. A linear regression equation was used to test the conflicting propositions of the 2 theories. The results confirmed the prediction of the "relative deprivation" theory. A possible interpretation is that test scores serve to adjust high school grades for the academic ability differences between high schools in the same manner and degree as selectivity adjusts college grades for differences between colleges. (WM)

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Abstract

Relative deprivation theory (Davis, 1966) postulates that attending a highly selective college adversely affects motivation for graduate study because students usually obtain relatively poorer grades than they would have at a less selective college; the poorer grades leading to a relatively low self-evaluation of their intellectual capacity for graduate study. Alternatively, environmental press theory (Thistlethwaite and Wheeler, 1966) posits that motivation for graduate study is increased by attending a highly selective college because the environmental press favors advanced study. A logical model for testing the contrasting predictions of the two theories and some preliminary evidence favoring relative deprivation theory are presented.

A STUDENT'S DILEMMA: BIG FISH--LITTLE POND OR LITTLE FISH--BIG POND[1]

Charles E. Werts[1] and Donivan J. Watley

Educational Testing Service National Merit Scholarship Corporation

Suppose that a high school senior has decided to attend either College A or College B, both of which have accepted him for admission, and he seeks the assistance of his counselor in choosing between them. The counselor learns from his investigation that admission standards (grades and test scores) are much higher at College A than at College B. He also learns that the intellectual climate at College A influences students towards obtaining a PhD or equivalent, whereas the climate at College B influences students towards termination at the baccalaureate. Discussion with the student reveals that he plans to obtain a master's degree, a goal that appears reasonable in terms of his past grades and test scores. On the basis of predicted grades, he should get superior grades at College B but barely passing grades at College A. Therefore, the prediction is that he could be either a "big fish in a little pond" at College B or a "little fish in a big pond" at College A. To help resolve this dilemma, what information should the counselor provide about this student's probable performance in these two college environments?

Two relevant theories have been advanced. The theory of "relative deprivation" (Davis, 1966) suggests that this student become a big fish in a little pond at College B. Davis argued that a student's conception of his academic ability is an important determiner of educational and career plans, and that

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students use their college grades as an ability gauge. In evaluating his academic ability, the student looks at his grades compared with the grades of his classmates, although in doing this he does not take into consideration the academic ability differences between colleges. Therefore, according to relative deprivation theory, if the counselee attends College A instead of College B, his relatively poorer grades will lead to a devaluation of his ability self-concept and thus to a decrease in his educational plans.

In contrast, the "environmental press" theory (Thistlethwaite and Wheeler, 1966) suggests that it is better for this counselee to attend College A--to be a little fish in a big pond. It predicts that, as a result of the "environmental press," a student's educational plans will approach the norm of the college he attends. Therefore, if the counselee attends College A, his educational plans will be upgraded; but if he goes to College B--where the norm on educational plans is only the bachelor's degree--his plans will be lowered.

The opposing predictions of the relative deprivation and environmental press theories can be tested by an input-output model in which the output variable is educational plans at the end of a given number of years in college and the input variables are selected student characteristics at the time of college entrance. In such a model, Astin (1962) has shown that the characteristics of students a college enrolls (input) are the major determiner of the characteristics of its graduates (output). The environmental press theory, depicted in Figure 1, asserts that the "selectivity" of the college also is a determiner of output; in other words, the environmental press at highly selective colleges motivates students to increase their educational plans. To assume that more selective colleges have higher norms seems plausible in light of Astin's (1964) findings that "selectivity" is closely associated with "intellectual" atmosphere.

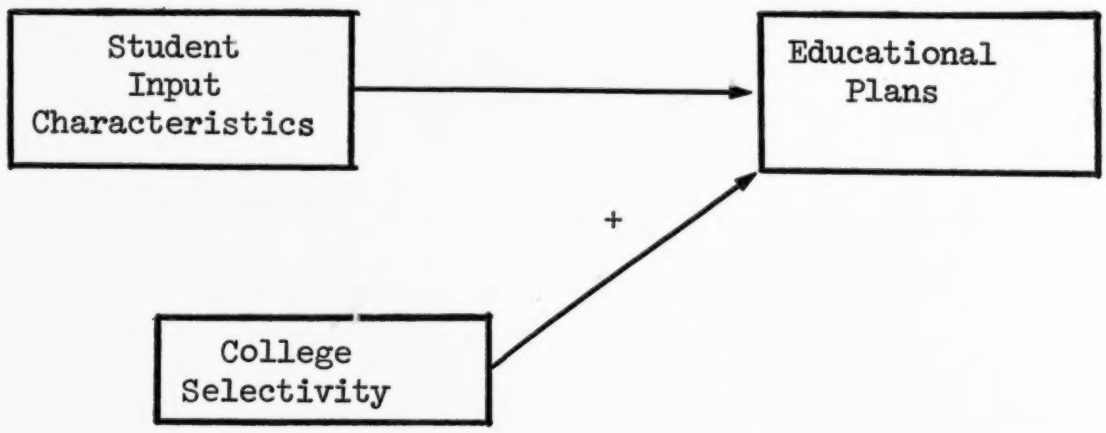

Fig. 1 Schematic model of environmental press theory

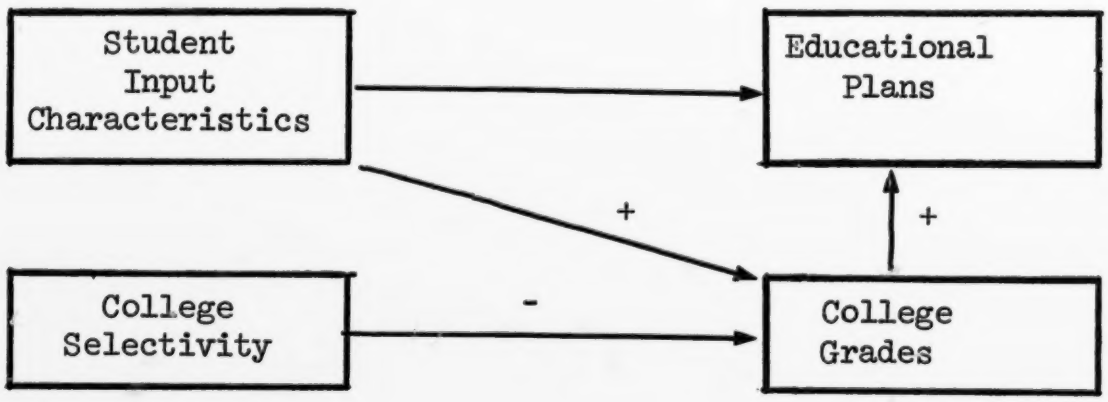

Fig. 2 Schematic model of relative deprivation theory.

The relative deprivation theory is depicted in Figure 2. In addition to the fact that student input characteristics are an important determiner of both college grades and educational plans, this theory posits that:

1. The more selective the college a student attends, the lower his grades will be; thus, from this standpoint, college selectivity is a negative determiner of college grades.

2. College grades are a positive determiner of educational plans; that is, grades are a determinant of a student's conception of his ability, which in turn affects his educational plans.

3. College selectivity does not <u>directly</u> determine later educational plans because students do not adjust their ability self-concepts to take

into account ability differences between colleges; thus, educational plans are not adjusted for intercollege differences.[2]

Procedure

Statistical Model

A linear regression equation was used to test the conflicting propositions of the two theories. A zero regression weight for an independent variable is interpreted to mean that it is not a determinant of the dependent variable. A negative regression weight denotes a negative determinant and a positive weight denotes a positive determinant. When the dependent variable is sophomore educational plans and the independent variables are student input measures, college selectivity, and college grades, environmental press theory predicts that selectivity will have a positive regression weight; whereas relative deprivation theory predicts that selectivity will have a zero weight and college grades a positive weight. When the dependent variable is college grades and the independent variables are student input measures and college selectivity, relative deprivation theory predicts that selectivity will have a negative regression weight.

Excellent discussions of the logical and statistical procedures used in this study are provided by Blalock (1961), Johnston (1963), Wold and Jureen (1953), and Duncan (1966). The following mathematical notations and

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[2] In a developmental sequence such as that shown in Figure 2, i.e. selectivity → college grades → educational plans, the independent effect of college selectivity on educational plans is zero (Blalock, 1961). It should be noted, however, that statistical findings which suggested that college selectivity was a positive determinant of educational plans would be difficult to interpret. These findings could be interpreted as support for the "environmental press" model (Figure 1); or they could imply, in accordance with the "relative deprivation" model (Figure 2), that students modify their ability self-concepts and their educational plans to adjust for the ability differences between colleges. Only a more complex model that included ability self-concept--measured both at the time of college entrance and at the time of followup--would provide the basis for choosing between these interpretations.

abbreviations are used:

X_1 = variable 1 = Father's education = FaEd

X_2 = variable 2 = National Merit Scholarship Qualifying Test scores = NMSQT

X_3 = variable 3 = High school grade average = HSG

X_4 = variable 4 = Educational plans on college entrance = FR. PLANS

X_5 = variable 5 = Selectivity of college attended = SELECT

X_6 = variable 6 = Freshman college grade average = CG

X_7 = variable 7 = Level of educational plans at sophomore followup = SO. PLANS

The two regression equations relevant to this study are:

$$b^*_{71}X_1 + b^*_{72}X_2 + b^*_{73}X_3 + b^*_{74}X_4 + b^*_{75}X_5 + b^*_{76}X_6 = X_7 + e_7 \quad (1)$$

$$b^*_{61}X_1 + b^*_{62}X_2 + b^*_{63}X_3 + b^*_{64}X_4 + b^*_{65}X_5 = X_6 + e_6 \quad (2)$$

In order that the regression coefficients may be directly compared with each other, these equations are written using beta weights (b*) instead of unstandardized regression weights. A beta weight measures the independent or unique contribution of a given variable to the prediction of the dependent variable; if one is twice the size of another, it is twice as important in predicting the dependent variable (Steel and Torrie, 1960, p. 284). Thus b^*_{71}, which is commonly written $b^*_{71.23456}$, represents the contribution of X_1 to X_7 independently of the contributions of X_2, X_3, X_4, X_5, and X_6, i.e., a beta weight does not include the joint effects with other independent variables. Regression coefficients are superior to partial correlations when making causal inferences in linear models (Blalock, 1964).

Before the regression equations are set up, the literature relevant to the theories in question should be carefully searched so that no variable known to influence the output is omitted. If the investigator is willing to assume that all other determinants of X_7 are independent of variables X_1 through X_6, then these variables, denoted by e_7 in Equation 1, will not

affect the size of the beta weights. It is generally true that random error in the dependent variable does not affect the regression coefficient, whereas random error in the independent variable does reduce the coefficient (Walker and Lev, 1953, pp. 305-308).

Data Collection

In the fall of 1961, Astin (1965c) collected input data for 127,125 entering freshmen at 248 four-year colleges and universities. With few exceptions, the complete freshman class at each institution was studied. The sample of institutions was heterogeneous in size of enrollment, type (e.g., coeducational, public, private, nondenominational, denominational), and quality (e.g., PhD productivity). At the time of registration each freshman completed a short information form that included the following questions:

1. Your high school average (circle one):

D	C	C+	B-	B	B+	A-	A	A+
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

2. Highest degree planned (circle one):

Less than BA or BS	BA BS	MA MS	PhD EdD	MD DDS	LLB BD	Other: _____
(1)	(2)	(3)	(4)	(4)	(4)	(5)

3. Father's education (circle one):

Grammar school	Some high school	H. S. grad.	Some college	College degree	Post-grad degree
(1)	(2)	(3)	(4)	(5)	(6)

4. Circle one: Male Female

In question 2, the MD, DDS, LLB, and BD degrees were assigned the same code (4) as PhD and EdD because of the occupational prestige and the number of years of training associated with these professional degrees.

Followup data were obtained in the summer of 1962 as part of a larger study of the intellectual and social environments of undergraduate institutions

(Astin, 1965b). A 12-page questionnaire was mailed to approximately the same number of students at each of the 248 institutions. In large institutions, questionnaire recipients were selected by random sampling; in coeducational institutions, an equal number of males and females were chosen. About 55 percent of the approximately 60,000 questionnaires mailed were returned. The return rate per institution, which varied from 20 percent to over 90 percent, correlated positively with "selectivity." After the questionnaires with large amounts of missing information were discarded, usable information remained for 16,141 male and 14,417 female respondents.

The questions applicable to this study were:

1. What is the highest level of education you expect to complete? (circle one)

	(code)
Less than bachelor's degree. . .	1
BA or BS	2
MA or MS	3
PhD or EdD	4
MD or DDS	4
LLB	4
BD	4
Other (circle and specify)_____	-

2. What is your average grade so far in college? (Circle one)

	(code)
A	7
A- or B+ . . .	6
B	5
B- or C+ . . .	4
C	3
C- or D+ . . .	2
D or less . . .	1

National Merit Scholarship Qualifying Test (Science Research Associates, 1967) scores were obtained for two-thirds of the followup sample. Since this test is taken on a voluntary basis, scores were not available for the entire sample. The NMSQT is a test of educational development administered in the latter part of the junior year in high school as part of a national talent

search. This analysis used the Composite Score, which is obtained by averaging the scale scores on the five subtests: English Usage, Mathematics Usage, Social Studies Reading, Natural Sciences Reading, and Word Usage. Although the questionnaire respondents for whom NMSQT scores were available were clearly a biased subsample, correlations on other measures (i.e., father's education with high school grades, high school grades with selectivity, father's education with selectivity) for respondents and nonrespondents varied within .01 of each other, which suggests that the error introduced by this bias is not serious.

Table 1

Correlation Matrix for a Sample of College Freshmen

	Males (N = 2,000)						
	FaEd	NMSQT	HSG	FR. PLANS	SELECT	CG	SO. PLANS
FaEd		.202	.045	.205	.286	.053	.201
NMSQT	.250		.514	.357	.518	.386	.286
HSG	.053	.468		.329	.420	.480	.320
FR. PLANS	.122	.265	.230		.320	.244	.622
SELECT	.321	.496	.233	.207		.126	.228
CG	.060	.365	.525.	.138	.033		.335
SO. PLANS	.105	.240	.240	.541	.168	.231	
	Females (N = 2,000)						

Note:--All correlations were computed using a missing data correlation program. The Correlations for males are above the diagonal, those for females below the diagonal.

Because the amount of computer time required for the total sample would have been extensive (20 minutes for each 1000 cases), the correlations shown in Table 1 were computed on random samples consisting of one-eighth (~2000) of the male and one-seventh (~2000) of the female respondents. As a preliminary measure, all correlations were screened to ensure reasonable linearity

of regression and generally unimodal distributions. All correlations were computed with a missing data program.

The college "selectivity" index was devised by Astin (1965a). This index is the proportion of high-ability students among entering freshmen at each college. For a sample of 105 colleges, Astin found that "selectivity" correlated .88 with mean Scholastic Aptitude Test (College Entrance Examination Board, 1961) scores (verbal and mathematics combined) of entering freshmen.

Although neither theory requires it, father's education (FaEd) was included as an input variable. FaEd is an important measure on which freshmen entering highly selective colleges differ from those entering less selective colleges, even after grades and test scores are controlled. It also exerts a significant influence on educational plans (Herriott, 1963).

Results

The standardized regression equations for males were:

$$.084\,X_1 - .025\,X_2 + .068\,X_3 + .552\,X_4 - .010\,X_5 + .174\,X_6 = X_7 \qquad (1)$$

$$.028\,X_1 + .248\,X_2 + .413\,X_3 + .081\,X_4 - .210\,X_5 = X_6 \qquad (2)$$

The corresponding equations for females were:

$$.018\,X_1 + .019\,X_2 + .037\,X_3 + .499\,X_4 + .037\,X_5 + .134\,X_6 = X_7 \qquad (3)$$

$$.041\,X_1 + .243\,X_2 + .456\,X_3 + .007\,X_4 - .208\,X_5 = X_6 \qquad 4)$$

College selectivity was a negative determinant of CG (b^*_{65} = -.210 for males, -.208 for females), as predicted by the relative deprivation theory. The most important determinant of CG was HSG (b^*_{63} = .413 for males, .456 for females), followed by NMSQT scores (b^*_{62} = .248 for males, .243 for females). Interestingly, the beta weights for NMSQT scores and college selectivity were similar in size. A possible interpretation is that test scores serve to adjust high school grades for the academic ability differences between

high schools in much the same manner and degree as selectivity adjusts college grades for the differences between colleges.

The regression weight crucial to choosing between the theories was b^*_{75}. Since it was near zero for both males (-.010) and females (+.037). it adheres more closely to the predictions of the relative deprivation theory. b^*_{76} was positive for both males (.174) and females (.134), ccnfirming the prediction of the relative deprivation theory.

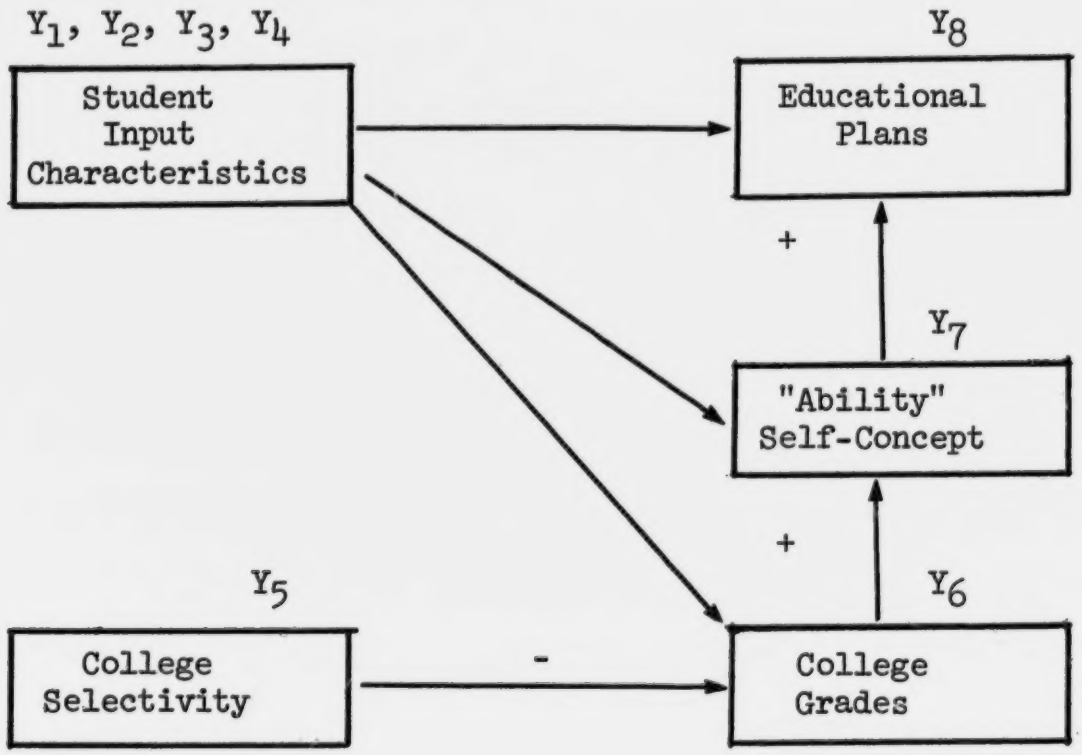
Prospectus

The purpose of this study was to develop a framework for testing the validity of two theories--the "relative deprivation" theory and the "environmental press" theory--regarding their conflicting predictions of college effects. In the hypothetical situation presented, results were obtained suggesting how a student might be affected by different college environments; that is, if he became a "big fish in a little pond" or a "little fish in a big pond." Perhaps the theoretical aspects of this situation are worth a further look.

Campbell and Stanley (1963) pointed out that correlational research is often useful in assessing causal hypotheses and exposing them to disconfirmation. That is, although correlation does not necessarily indicate causation, a zero correlation considerably lessens the credibility of an hypothesis; but a high correlation strengthens the possibility of causation. Thus, hypotheses derived from theory that do not survive this relatively simple test of disconfirmation are probably not worth subjecting to further study.

Although the evidence obtained in this study appears to support the relative deprivation theory, a more definitive, correlational study could be made before a more complicated, experimental study was attempted. Davis

recognized, for example, that it would be desirable to have correlational support for the assertion that a student's self-concept of ability is modified in relation to the college grades he gets; and that this modified self-concept in turn causes changes in the level of his educational plans. To test this assertion, a student's ability self-concept must be measured twice --when he enters college and again at the time of followup.



Variables for revised test of relative deprivation theory:

Y_1 = Input: educational plans
Y_2 = Input: test scores
Y_3 = Input: high school grade average
Y_4 = Input: "ability" self-concept
Y_5 = College "selectivity"
Y_6 = College grades
Y_7 = Followup: "ability" self-concept
Y_8 = Followup: educational plans

$$b^*_{81}Y_1 + b^*_{82}Y_2 + b^*_{83}Y_3 + b^*_{84}Y_4 + b^*_{85}Y_5 + b^*_{86}Y_6 + b^*_{87}Y_7 = Y_8 \quad (a)$$

$$b^*_{71}Y_1 + b^*_{72}Y_2 + b^*_{73}Y_3 + b^*_{74}Y_4 + b^*_{75}Y_5 + b^*_{76}Y_6 = Y_7 \quad (b)$$

$$b^*_{61}Y_1 + b^*_{62}Y_2 + b^*_{63}Y_3 + b^*_{64}Y_4 + b^*_{65}Y_5 = Y_6 \quad (c)$$

Fig. 3 Revised schematic model of relative deprivation theory.

Figure 3 shows a revised model of the relative deprivation theory when it is expanded to include the self-concept of ability. The regression equations for student output characteristics, ability self-concept, and college grades are shown as (a), (b), and (c). It should be noted that the absence of an arrow between college "selectivity" and "ability" self-concept corresponds to the theoretical statement that students do not adjust their self-concepts for ability differences between colleges ($b^*_{75} \simeq$ zero). As Figure 3 indicates, this model is now enlarged to include three specific predictions of the relative deprivation theory: college selectivity negatively influences college grades (b^*_{65} is negative); college grades in turn influence self-concept of ability (b^*_{76} is positive); and self-concept in turn influences educational plans (b^*_{87} is positive). The regression weights for b^*_{81}, b^*_{82}, b^*_{83}, b^*_{84}, b^*_{71}, b^*_{72}, b^*_{73}, b^*_{74}, b^*_{61}, b^*_{62}, b^*_{63}, and b^*_{64} have little bearing on the theory, except to signify that college output largely depends on input.

It is interesting to note that relative deprivation theory does not--although environmental press theory does--state whether college selectivity directly influences educational plans measured at the time of followup. Because there is no theoretical prediction for b^*_{85}, no arrow was drawn between "selectivity" and "output" in Figure 3. If b^*_{85} were found to be positive and if the predictions for b^*_{65}, b^*_{75}, b^*_{76}, and b^*_{87} were confirmed, "environmental press" and "relative deprivation" would appear to be operating simultaneously. It may be deduced therefore that the theories are logically exclusive, operating by different mechanisms.

The schematic representation of a theory may reveal that the theory itself is logically incomplete, and gaps can be discovered that might otherwise be ignored. In Figure 3, for example, there is no definite prediction for b^*_{86}, nor is there any indication of what it means.

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